

# RT Metro

## Trials and Tribulations of a Rail Start-Up

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CAMERON BEACH

**P**utting Sacramento's RT Metro on the track took years of coordination and cooperation among government bodies, internal departments, contractors, and vendors. A core management staff was brought aboard early to plan the system's eventual operation. Governmental bodies other than the system operator itself, Sacramento Regional Transit (RT), eventually bowed out, giving RT full responsibility. City redevelopment funds were tapped to make up a shortfall in the original budget. Well in advance of the opening of the system's first leg in March 1987, RT managers negotiated with labor unions, assem-

bled an Operations Coordination Committee as a liaison with law enforcement and fire department officials, and established a training program. As sections of track were turned over for testing, extensive walk-throughs were done, followed by further testing using a light rail vehicle (LRV). The LRVs themselves were tested extensively and a video camera mounted on top of one of them was used to check catenary construction and wire stagger. About 3 months before the system opened, simulated revenue service was begun to make sure the system would operate as expected.

AFTER 10 YEARS OF PLANNING and 5 years of construction, the Sacramento Regional Transit (RT) District opened the first 9.5-mi leg of RT Metro on March 12, 1987. The second leg, completing the 18.3-mi starter line, opened September 5, 1987.

Regional Transit was not initially responsible for construction of the line. A joint-powers agreement was signed with the City of Sacramento, the County of Sacramento, Caltrans, and Regional Transit to form the Sacramento

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*Regional Transit, P. O. Box 2110, Sacramento, Calif. 95812.*

Transit Development Agency (STDA) in 1981. STDA's mission was to design, engineer, and construct a light rail system for Sacramento that would be turned over to Regional Transit for operation upon completion.

Early on, RT's senior management recognized the pitfalls of having a system designed and constructed without extensive input from the operator. With the line scheduled to open in spring 1985, RT General Manager David Boggs appointed a light rail manager in July 1983. This manager would be responsible for putting together a start-up plan, which would include the hiring and training of all employees. The manager was also responsible for coordinating design and construction activities with STDA.

By mid-1984, it became apparent that the spring 1985 opening date was not realistic. During this time, it also became apparent that the \$131 million budget was not sufficient to construct the system as designed. Because RT had the financial responsibility for completing the project, it was decided that the construction responsibility should be RT's as well.

On August 15, 1985, the STDA was dissolved and responsibility for the light rail project fell solely on RT. At that time, a more realistic budget of \$159 million was adopted utilizing city redevelopment funds to make up the difference.

During these times, RT's operations group put together a staffing plan that called for 68 employees to operate and maintain the light rail system. While staff felt that the number was low, budgetary considerations did not allow for higher staffing levels. In early 1985 the transportation superintendent and the maintenance superintendent came on board. The transportation superintendent authored the first draft of an operating rulebook. The maintenance superintendent was kept busy coordinating design reviews with the vehicle manufacturer, traction power installer, signal installer, and trackwork contractors.

The staffing plan was amended numerous times, primarily as the result of input from peer reviews conducted in 1985 and 1986. Primary increases in staffing occurred in wayside maintenance, fare inspection, and, to a lesser extent, in vehicle maintenance. The maintenance staff today is able to keep up with RT's requirements, but as the system gets older, additional personnel will be necessary.

During 1985 and 1986, negotiations were conducted with the Amalgamated Transit Union (ATU) and the International Brotherhood of Electrical Workers (IBEW) regarding wages and working conditions for the light rail operations employees who would be members of the respective bargaining units. The ATU represented the bus operators and office clerical staff, while the IBEW represented the maintenance employees. It is interesting to note that the IBEW representation came about because RT's predecessors operated the streetcar system in Sacramento until its abandonment in 1947.

Issues discussed with the unions included methods for selecting train operators and maintenance personnel, job descriptions, wages, and representation of new classifications. Visits were made to other rail operating properties represented by the ATU and IBEW to compare job duties and provide insight for union representatives who had previously only dealt with bus-related issues. Negotiations with the unions were concluded in late 1985 with the signing of side agreements to the existing contracts.

All work on the system is done by RT's own employees with the exceptions of station cleaning, landscape maintenance, security, and weed abatement, which are contracted out to local firms. When they become necessary, tasks such as traction motor rebuilding will also be contracted out.

Another area that required a great deal of attention was coordination with the police and fire departments. Because streetcars had been gone from Sacramento for over 40 years, the whole idea of overhead wires in the middle of a street was foreign to fire-fighting personnel. In addition, law enforcement officers needed additional training on how to deal with trains operating in traffic on the street.

To address this problem an Operations Coordination Committee was created. It consisted of police officers, deputy sheriffs, highway patrol officers, fire chiefs, and their respective training personnel as well as RT rail operations staff. This group met every other month for almost 2 years prior to the system's opening. Numerous questions and issues were raised during these meetings. There is no doubt that the current good working relationship with these groups is due to these efforts.

Operations staff moved into the Metro Division Operations and Maintenance Facility during early November 1986. The first light rail vehicle (LRV) was delivered 2 weeks later. To have properly trained personnel to operate the cars, the transportation superintendent, the two senior transportation supervisors, and the two most senior train operators were sent to Calgary, Alberta, for extensive training in LRV operation and train control. To this day, these individuals talk about their "vacation" in Calgary. All but one of them were native Californians who had a difficult time adjusting to the  $-15^{\circ}\text{F}$  to  $-35^{\circ}\text{F}$  temperatures that they encountered in Alberta in November.

It is important to note at this point that over 85 percent of RT Metro's employees were promoted from within the ranks. RT made a commitment early on that an expansion into light rail would mean new opportunities for existing staff. Only those positions that required specific technical expertise were filled from outside the agency. Prior to sending staff to Calgary, bus operators were asked to sign a list indicating their interest in light rail training. At that time, the level of interest that would be expressed was unknown. But after 1 week 175 of RT's 320 bus operators indicated they wanted to learn to run trains. The two operators selected to go to Calgary had

almost 60 years of cumulative experience driving buses for RT and its predecessors.

The process in which the construction department turned over areas of track for testing and operation took a great deal of effort and patience on everyone's part. Sacramento was fortunate to have a high level of cooperation and camaraderie between construction and operations personnel throughout the project. Without this, it is questionable whether the system would ever have worked. Extensive walk-throughs were held on all phases of construction by operations personnel. Prior to any testing, every foot of track and overhead was inspected by operations staff. Following successful completion of this last walk-through, an LRV would be moved at no greater than walking speed through the affected territory. Speeds would be increased in 5- or 10-mph increments until track speed was reached. This process was slow and tedious, but in one case it prevented an LRV from hitting a curb that was too high and pointed out such problems as trees growing into the overhead.

Prior to train operations on the test track, procedures were developed for test track limits and "red tagging" of traction power so that both contractors and testing crews could work simultaneously. The buffer zones between construction and operations were established with track warrant and red tag procedures being rigidly enforced by operations personnel.

An extensive testing and burn-in program was developed for testing and accepting LRVs. Our first two operators made so many trips over the original 1.5-mi test track there were days they felt like they were operating a horizontal elevator.

As a part of their training, operators had been instructed that a dark (unlit) signal must be treated as a "red" signal. As signal equipment was installed by the contractor, burlap bags were used to cover the signal heads so that operators did not have to disobey operating rules.

As longer sections of the system were completed, a formal program was instituted that provided for extensive testing of the system and its components prior to unlimited use by operations. Once the walk-through and slow running tests were completed, a video camera was mounted on top of an LRV to check catenary construction and wire stagger. Following this, extensive system tests were conducted of each of the components, i.e., signals, switch machines, substations, traffic signals, and dynamic clearances. For example, each signal was checked for visibility from an operating cab. Each possible routing was checked to verify proper signal aspects and prevention of conflicting moves. Each substation was load tested by having two fully loaded four-car trains accelerate away from each other on a single feed.

Once this was accomplished, an extensive series of integrated tests was conducted to determine that all of the subsystems worked together properly. This included radio coverage tests, platform measurements with an LRV to

verify clearances, and timing of traffic signal preemption devices to optimize train movements.

About 3 months prior to the opening of the system, an extensive program of operational testing was begun. Called simulated revenue service, this was the final test of whether the light rail system would operate as the planners and engineers intended. The system was designed for eight trains to operate on a 15-min headway. A computer simulation compiled by Foster Engineering of San Francisco showed that such an operation was possible, but that meets would be close on some stretches of single track. A plan to include additional sections of double track was deferred by the board until actual operation confirmed the need for the expenditure of additional (and very scarce) capital funds.

Included in simulated revenue service were the final aspects of operator training, for example, simulated and actual passenger boardings, elderly and handicapped access, schedule adherence, train meets, cuts and adds to train consists, and verification of running times previously plotted by computers. In addition, several incidents were staged to test the acuity of both the transportation and maintenance personnel as well as various public safety agencies. These incidents included derailments, collisions, signal failures, and other disruptive activities.

During the final 2 weeks prior to opening, a multialarm fire was to be simulated on the K Street Mall during the afternoon rush hour. The purpose of this test was to determine RT's ability to respond to such an incident and maintain an appropriate level of service. But 2 days before the test was to occur, there was an actual multialarm fire on the K Street Mall. The Sacramento Fire Department was able to utilize specifically created procedures for shut down of traction power and protection of fire fighters. RT personnel were able to test their ability to cope with a major disruption to service without actually affecting the riding public.

The simulated revenue service testing proved to be an unqualified success. Without this herculean effort, it is doubtful that the March 12, 1987, opening of Sacramento's light rail system would have come together so well.

Had we the opportunity to go back and do it again, relatively few things would have been done differently. Operations input into the signal system design would have been greater. Signal design was based on the Association of American Railroads standards. As an example, a green-over-red aspect would be displayed at a diverging route. This wasn't a problem for the system's ex-railroaders, but bus division employees had been taught never to go past a red signal. The green-over-red became an exception to the "never" rule. Therefore, in the interest of uniformity, the aspects and heads were reworked to provide that any red aspect would require permission from Metro Control before proceeding. In addition, we would have insisted on more

comprehensive training from the signal and traction power contractors, similar to what was provided by the vehicle manufacturer.

During the construction and start-up process there were many occasions when operations staff, engineers, test crews, and contractors became frustrated with the whole process. But without the great deal of cooperation and attention put forth by these groups, Sacramento's system would not be where it is today.